[0051]

Existing device 80 and spare device 81 are connected in a parallel fashion between first line 11 and second line 41, each of which comprises R-connection circuit 1, processor 2, L-connection circuit 4, and memory circuit 7, and the device is controlled by the software held in memory circuit 7 to serve the function of packet relay between first line 11 and second line 41. Existing device 80 actually executes communication relay, and spare device 81 is alternative to exiting device 80 in case of relay failure of existing device 80.

(B) Processing flow of the communication relay system in the preferred embodiment of the present invention.

The processing flow of the communication relay system of the present invention will be described with reference to Fig. 3 to Fig. 7.

[0052]

In the communication relay device, with the device turned on, device status information containing the representative ID number, inherent ID number, mode information, status information, and shift information is set as the initial value in status table 8 provided in memory circuit 7, thereby setting existing device 80 and spare device 81. In the case of existing device 80, it goes to step S03, and in the case of spare device 81, it goes to step S24. (Step S01, S02)

The communication is monitored by monitor 5, and in case no communication is made in a specific length of time, it goes to S29, and in

case the communication is made in a specific length of time, it goes to S04.

[0053]

When R-connection circuit 1 detects the arrival of packet, it goes to step S06, and when L-connection circuit 4 detects the arrival of packet, it goes to step S13. (Step S04, S05)

The packet is once held in R-connection circuit 1, and the arrival of packet is noticed by R-connection circuit 1 to relay 3. (Step 6)

The packet is transferred by relay 3 from R-connection circuit 1 to L-connection circuit 4, and the result of transfer is monitored by monitor 5. (Step S07).

In case the transfer is successful, it goes to step S09, and in case of transfer failure, it goes to step S19. (Step S08)

The packet is delivered from L-connection circuit 4 to second line 41, and also, the normal device status is noticed by monitor 5 to controller 6. (Step S09)

Status information for noticing the normal device status is produced by controller 6 with reference to status table 8. (Step S10)

Status information for noticing the normal device status is transferred by controller 6 to L-connection circuit 4. (Step S11)

All the other communication relay devices are specified by L-connection circuit 4 according to the inherent ID number or broadcast address or multicast address, and status information for noticing the normal device status is delivered second line 41. (Step S12)

Packet is received by L-connection circuit 4, and in case the packet is status information, the arrival of packet is noticed by L-connection circuit 4

to controller 6, then it goes to step S23. In case the packet is not status information, the arrival of packet is noticed by L-connection circuit 4 to relay 3, then it goes to step S15. (Step S13, S14)

The packet is transferred by relay 3 from R-connection circuit 1 to L-connection circuit 4, and the result of transfer is monitored by monitor 5. (Step S15)

In case the transfer is successful, it goes to step S17, and in case of transfer failure, it goes to step S19. (Step S16)

The packet is delivered from R-connection circuit 1 to remote line 11, and also, the normal device status is noticed from monitor 5 to controller 6. (Step S17)

Status information for noticing the normal device status is produced by controller 6 with reference to status table 8, then it goes to step S11. (Step S18)

Abnormal device status is noticed from monitor 5 to controller 6. (Step S19)

Status information for noticing the abnormal device status is produced by controller 6 with reference to status table 8. (Step S20)

Status information for noticing the abnormal device status is transferred by controller 6 to L-connection circuit 4. (Step S21)

All the other communication relay devices are specified by L-connection circuit 4 according to the inherent ID number or broadcast address or multicast address, and status information for noticing the abnormal device status is delivered second line 41 to stop the operation. (Step S22)

Status table 8 is renewed by controller 6 according to the status information, and it goes to step S03. (Step S23)

The arrival of packet is detected by L-connection circuit 4, and it goes to step S25. (Step 24)

The packet that arrives L-connection circuit 4 is once held therein and the arrival of packet is noticed by L-connection circuit 4 to controller 6. (Step S25)

In case the packet that arrives L-connection circuit 4 is status information, it goes to step S27, and in case it is not status information, it goes back to step S24. (Step 26)

Controller 6 operates according to the status information, and in case of normal device status, it goes to step S24, and in case of abnormal device status, the mode of existing device 80 to which the abnormal device status is noticed is changed to spare, and also, the status information is renewed to abnormal device status, while the mode of spare device 81 of the highest shift order is changed to existing, and status means 85 is renewed so that the shift order of remaining spare device 81 is advanced, then it goes to step S03. (Step S27, S28)

Whether it is abnormal device status or not is checked by monitor 5, and in case of abnormal device status, it goes to step S19, and in case of normal device status, it goes to step S31. (Step S29, S30)

Normal device status is noticed from monitor 5 to status table 8. (Step S31)

Status information for noticing normal device status is produced by controller 6 with reference to status table 8, and it goes to step S11. (Step

S32)

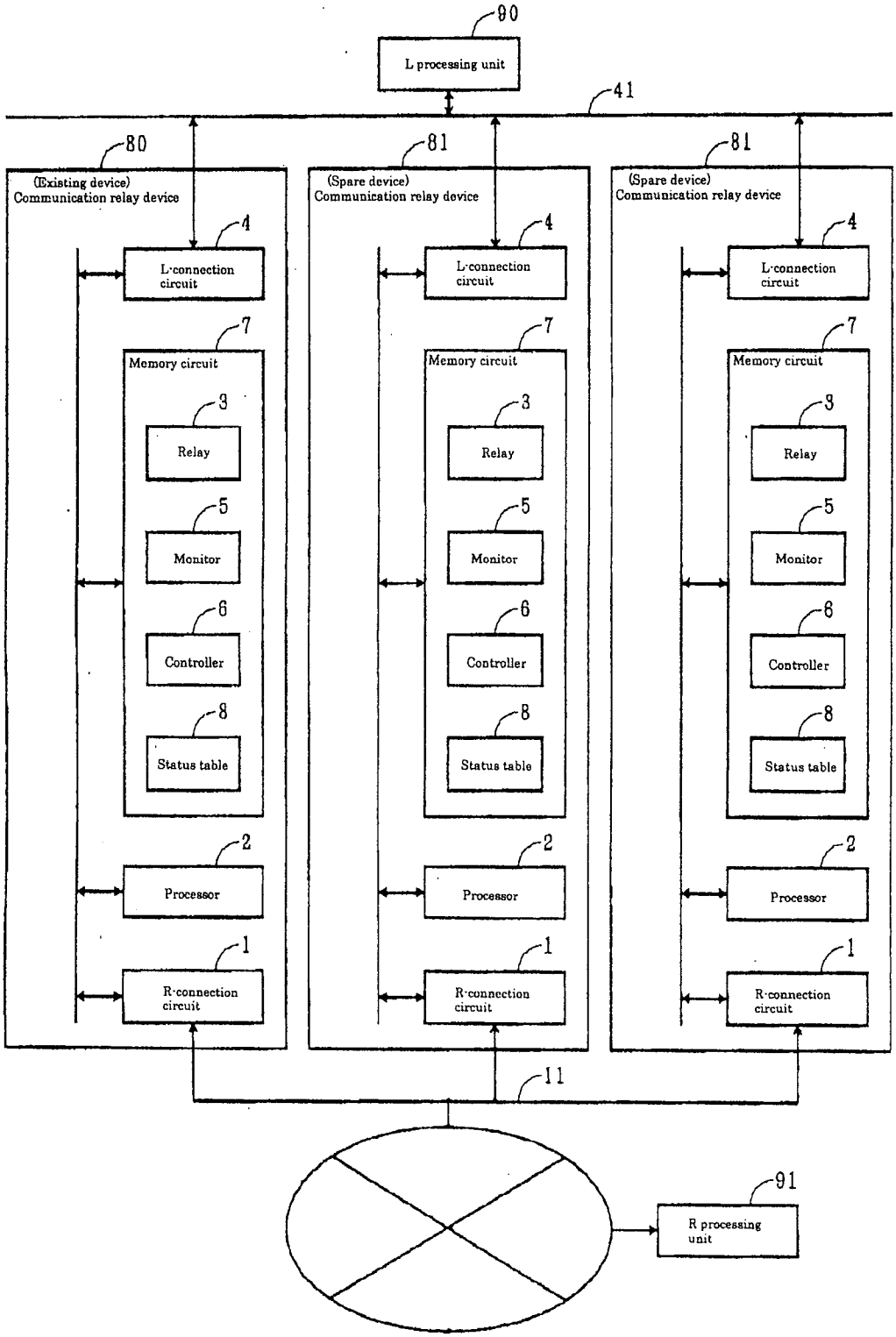
[0054]

[Advantages of the Invention]

As described above, according to the present invention, when the existing device becomes unable to execute packet transfer, the spare device automatically serves the function of transferring the packet in place of the existing device and continues the communication. Accordingly, it brings about such an industrial advantage that the existing device can be switched to the spare device in a short time without errors.

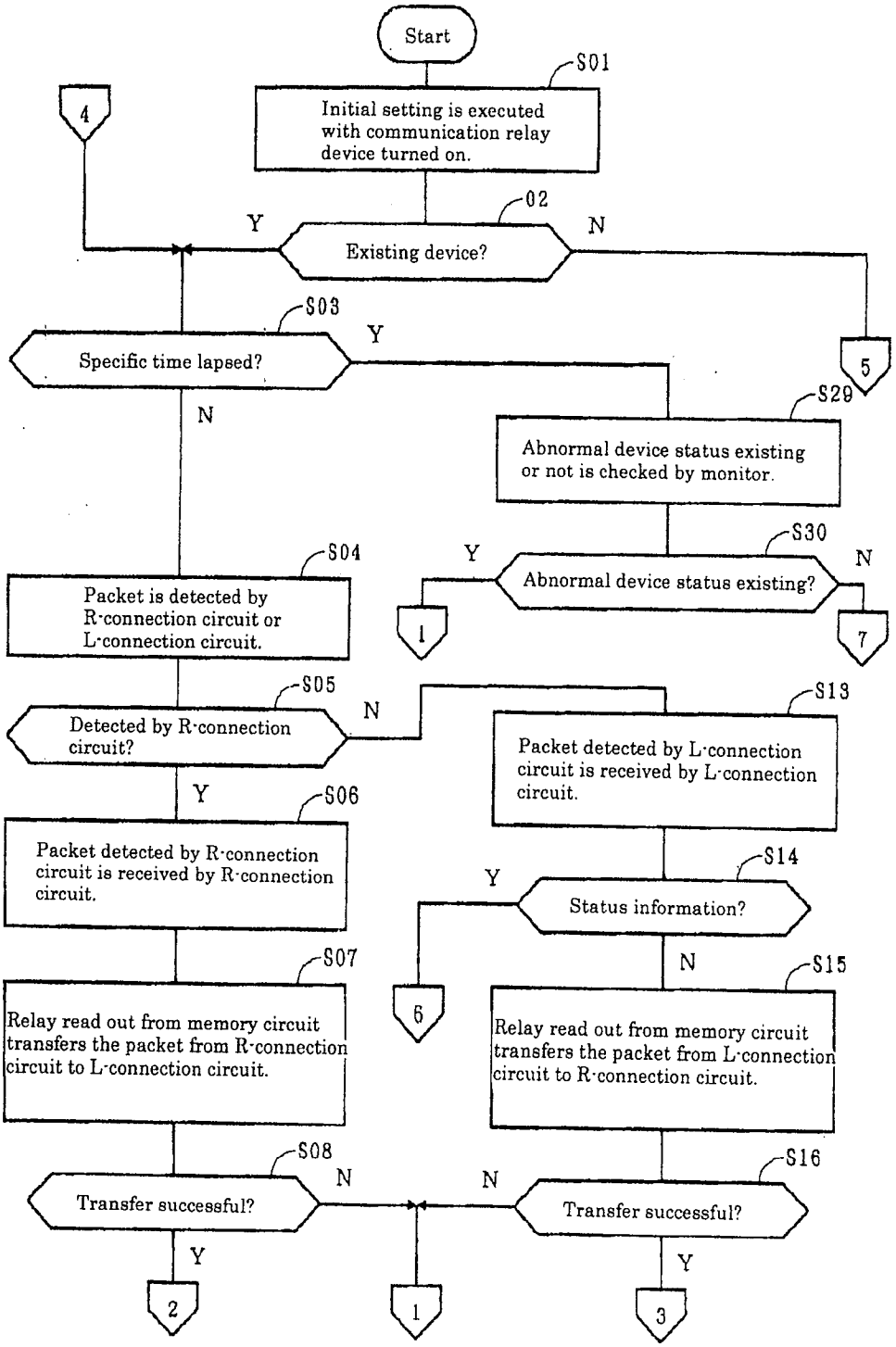
[Fig. 2]

Preferred embodiment configuration of the present invention



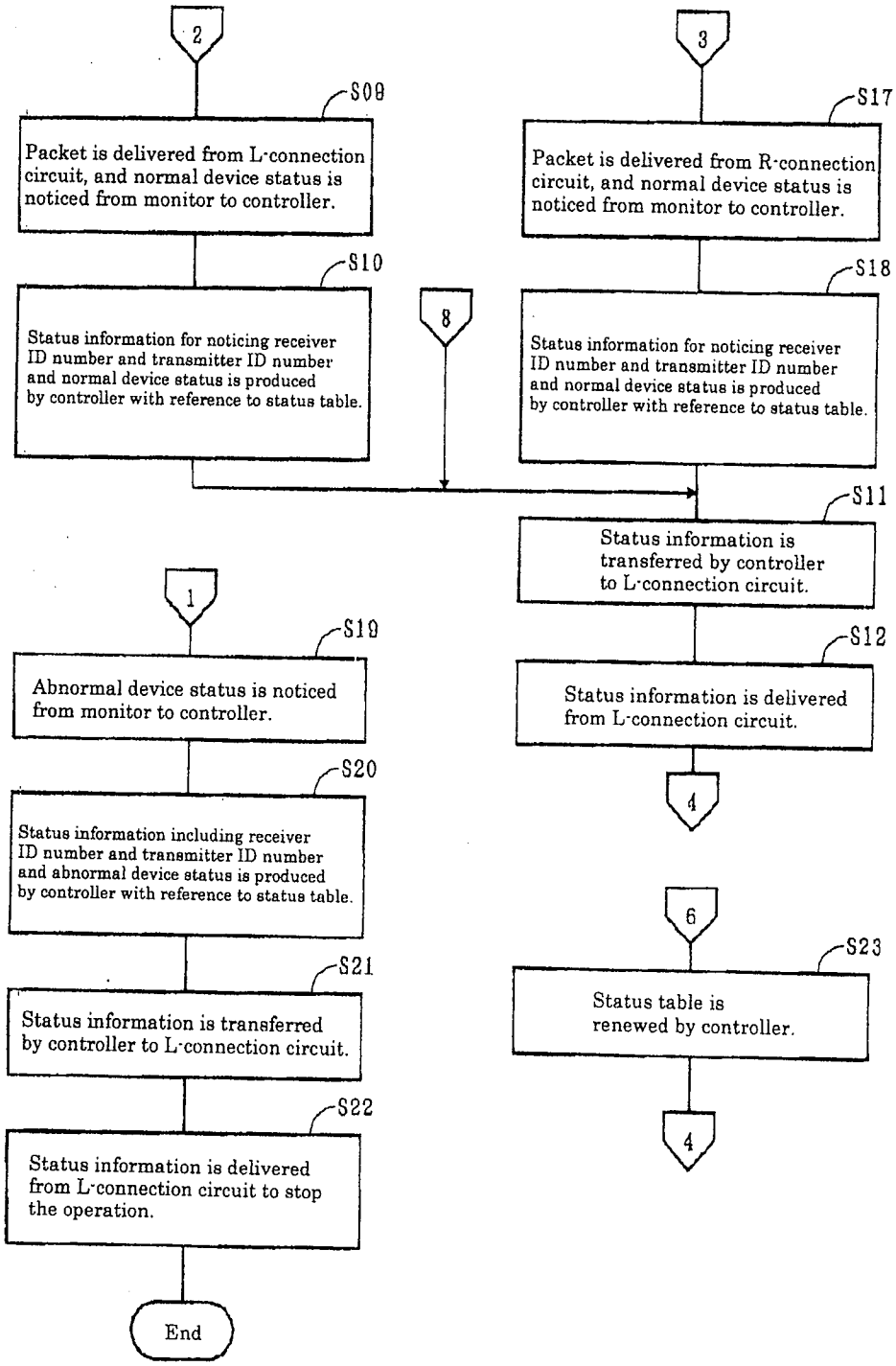
[Fig. 3]

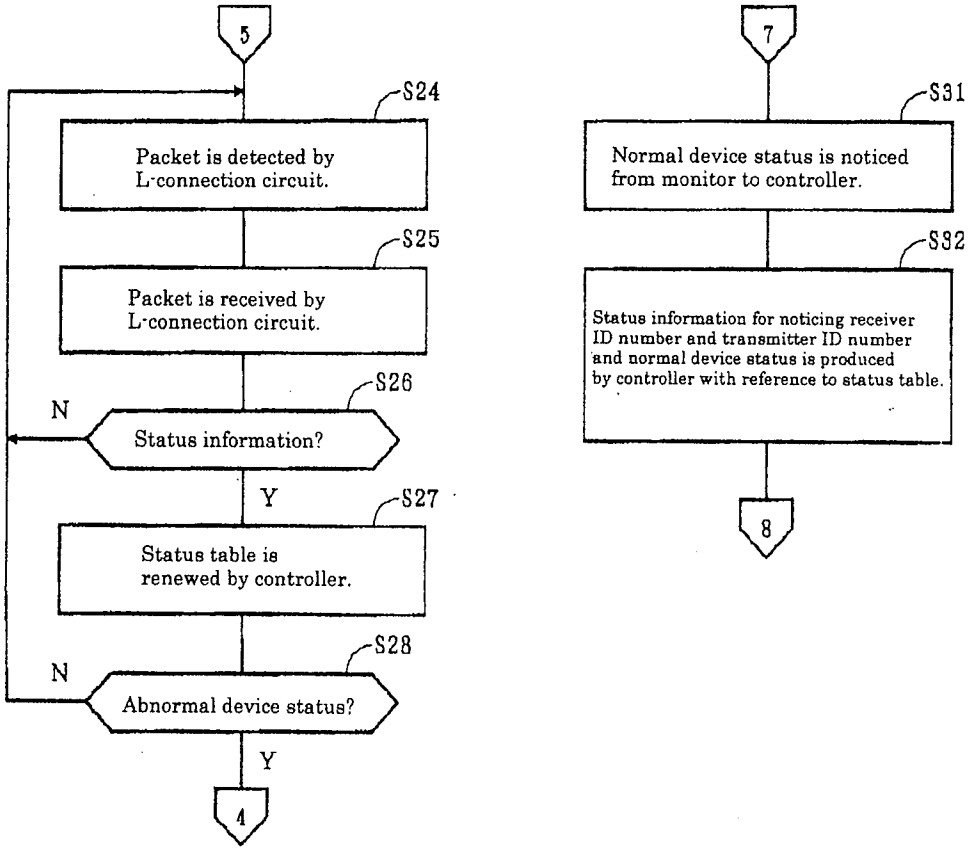
Preferred embodiment flow chart of the present invention (1)



[Fig. 4]

Preferred embodiment flow chart of the present invention (2)



[Fig. 5]

Preferred embodiment flow chart of the present invention (3)